

**REMARKS**

Claim 1 has been amended to recite that the indium oxide-tin oxide powder has a specific surface area of from 2.5 to 15 m<sup>2</sup>/g *when measured after calcination at 1100°C*. Support is found at paragraph [0037] and Production Example 4 at [0086]. New claim 9 finds support, for example, by reference to Production Example 3 in paragraph [0084] at page 34 of the specification (specific surface area of 4 m<sup>2</sup>/g -lower limit) and paragraph [0037]. Upon entry of this Amendment, which is respectfully requested, Claims 1-9 will be pending, of which, Claim 7 has been withdrawn from consideration.

**Response to Claim Rejections Under §§ 102/103**

Claims 1-6, and 8 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,030,507 to Lupton et al.

Claims 1-6, and 8 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Japanese document 11-11946.

Japanese Application No. 11-11946 (“JP ‘946”) corresponds to Lupton.

Applicants traverse, and respectfully request the Examiner to reconsider in view of the amendment to the claims and the following remarks.

The present invention relates to an indium oxide-tin oxide (“ITO”) powder having a SnO<sub>2</sub> solid solution amount in In<sub>2</sub>O<sub>3</sub> of 2.3 mass% or more and a specific surface area of from 2.5 to 15 m<sup>2</sup>/g *when measured after calcination at 1,100°C*. *See*, Claim 1 and the working Examples.

Specifically, in Production Example 1, an ITO powder of Example 2 was calcined at 1,100°C, to thereby form an ITO powder (specific surface area: 2.97 m<sup>2</sup>/g) for producing sintered ITO.

In Production Example 2, an ITO powder of Example 1 was calcined at 1,000°C, to thereby form an ITO powder (specific surface area: 7.7 m<sup>2</sup>/g) for producing sintered ITO.

In Production Example 3, an ITO powder of Example 2 was calcined at 1,050°C, to thereby form an ITO powder (specific surface area: 4.02 m<sup>2</sup>/g) for producing sintered ITO.

In Production Example 4, an ITO powder of Example 3 was calcined at 1,100°C to thereby form an ITO powder (specific surface area: 2.5 m<sup>2</sup>/g) for producing sintered ITO.

Thus, the specific surface area disclosed in paragraph [0037] clearly refers to the specific surface area measured after calcination.

An ITO powder having a post-calcination specific surface area within the presently claimed range allows for the production of a high density ITO. See, paragraph [0037].

In contrast, Lupton and JP '946 disclose that “[a]dvantageously, the ITO powder has a specific surface area according to the Brunauer-Emmett-Teller (BET) method of at most 3 m<sup>2</sup>/g with a mean primary particle size in the range of 0.03 μm to 0.2 μm.” See, col. 4, lines 34-37. However, the specific surface area reported by Lupton and JP '946 was not measured after calcination.

It is known in the art that the specific surface area varies in response to the calcining temperature (i.e., the higher the calcining temperature, the lower the specific surface area). Accordingly, if the specific surface area of the ITO powder according to Lupton and JP '946 is 3 m<sup>2</sup>/g before calcination, calcining at 1,100°C would produce an ITO powder having a considerably smaller specific surface area outside the scope of amended claim 1.

For at least this reason, the amended claims define novel subject matter. Moreover, there is no apparent reason in either of Lupton or JP '946 which would lead one of ordinary skill to employ an ITO powder of greater specific surface area (after calcination) so as to obtain a high-

density product. In fact, by setting an upper limit of as low as  $3\text{ m}^2/\text{g}$ , the prior art teaches away from producing a high density ITO, such that the present claims are also patentable over the cited prior art.

From a different aspect, the presently claimed ITO powder has an  $\text{SnO}_2$  solid solution amount in  $\text{In}_2\text{O}$  of 2.3 mass% or more. The “ $\text{SnO}_2$  solid solution amount in  $\text{In}_2\text{O}_3$ ” is defined as “the amount of tin oxide which has formed a solid solution with indium oxide” and is calculated from (A) the amount of deposited  $\text{SnO}_2$ , and (B) the  $\text{SnO}_2$  content. This limitation of the present claims also is not met by the cited prior art for the reasons discussed below.

The amount of deposited  $\text{SnO}_2$  (A) is obtained from the ratio between the integral diffraction intensity attributed to  $\text{In}_2\text{O}_3$  (222) and the integral diffraction intensity attributed to  $\text{In}_2\text{O}_3$  (110). The  $\text{SnO}_2$  content (B) is obtained from the ratio between the  $\text{In}_2\text{O}_3$  content and the  $\text{SnO}_2$  content. The  $\text{In}_2\text{O}_3$  content and  $\text{SnO}_2$  content are obtained from the ratio between an In element concentration and an Sn element concentration through ICP analysis. Specifically, the  $\text{SnO}_2$  solid solution amount differs from the amount of tin oxide present at the crystal grain boundary of indium oxide or from the amount of indium tin-oxide solid solution phase in an indium oxide crystal lattice.

In other words, when ITO powders having the same total tin oxide content have different  $\text{SnO}_2$  solid solution amounts, the respective powders have different properties and are therefore considered different species. Thus, by virtue of a large  $\text{SnO}_2$  solid solution amount in  $\text{In}_2\text{O}_3$ , the ITO powder of the present invention has high sinterability. As a result, a high-density sintered compact can be readily produced from the powder. Accordingly, a long-life ITO target can be produced. See, paragraphs [0028] to [0031] of the specification.

The ITO powder of the invention is produced through synthesis under wet conditions and recovery in a dry or wet format. In this regard, paragraph [0034] of the specification is reproduced below.

When a dry collection process or a wet collection process is employed, spray cooling by means of a high-speed gas flow at a Mach number of  $\geq 1$  (as disclosed in Lupton and JP '946) is not necessarily performed. The microparticles may flow at a maximum speed of 150 m/sec or less, preferably 100 m/sec or less, when the formed microparticles are captured by means of the liquid fluid. In the case where the microparticles are captured at approximately the above flow speed for quenching, the  $\text{SnO}_2$  solid solution amount in  $\text{In}_2\text{O}_3$  increases as compared with the case of a conventional wet synthesis method, thereby producing an ITO powder having increased sinterability. Even when an ITO powder containing a compound oxide ( $\text{In}_4\text{Sn}_3\text{O}_{12}$ ) is employed as a raw material, an ITO powder containing no compound oxide ( $\text{In}_4\text{Sn}_3\text{O}_{12}$ ) and having a  $\text{SnO}_3$  solid solution amount of 2.3 mass% or more can be produced.

Neither Lupton nor JP '946 discloses the presently claimed  $\text{SnO}_2$  solid solution amount. The ITO powders of Lupton and JP '946 are materially different from the ITO powder of the invention because they are produced under conditions different from those employed in the invention. Thus, Lupton and JP '946 fail to anticipate or render obvious the present claims.

Accordingly, withdrawal of the above rejections is respectfully requested.

Claims 1-6, and 8 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,762,768 to Goy et al.

Applicants respectfully traverse.

Goy discloses a target for cathodic sputtering formed of hot-pressed or hot isostatic-pressed indium oxide/tin oxide powder. Goy further discloses that the powder has a specific

surface area of approximately 0.3 m<sup>2</sup>/g according to the BET method, outside of the presently claimed range. *See*, col. 6, lines 10-12.

In addition, Goy fails to disclose or suggest a SnO<sub>2</sub> solid solution amount as presently claimed. Thus, Goy fails to anticipate or render obvious the present claims. Accordingly, withdrawal of the rejection is respectfully requested.

Claims 1-6, and 8 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Japanese document 63-199862 (“JP ‘862”).

Applicants respectfully traverse.

JP ‘862 discloses a technique of producing a sintered compact including oxidizing an In-Sn alloy, pulverizing the oxide to thereby form an oxide powder, compacting the oxide powder, and sintering the compact. However, JP ‘862 fails to disclose or suggest an ITO powder having a specific surface area (after calcination) within the presently claimed range.

In addition, JP ‘862 fails to disclose or suggest a SnO<sub>2</sub> solid solution amount. According to the production method disclosed in JP ‘862, in order to attain a state in which Sn completely forms a solid solution in an indium oxide lattice with tin oxide powder not being separated from the lattice, the amount of indium-tin-oxide solid solution phase in an indium oxide crystal lattice is thought to increase, similar to the case of JP ‘946. Thus, JP ‘862 fails to anticipate or render obvious the present claims. Accordingly, withdrawal of the rejection is respectfully requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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